

Epidemiologic Surveillance

Annual Summary for
**Westinghouse
Savannah River Company**



Prepared by the Epidemiologic
Surveillance Data Center, a joint program
of the University of Washington and the
Fred Hutchinson Cancer Research Center

This report was prepared by the staff of the Epidemiologic Surveillance Data Center at the University of Washington and the Fred Hutchinson Cancer Research Center in conjunction with the Office of Epidemiology and Health Surveillance, U.S. Department of Energy.

The following staff were responsible for data analysis:

Terri Watson, Data Coordinator
Kay Theis, Statistical Research Associate

Questions or comments may be directed to:

Dr. Thomas Vaughan
Epidemiologic Surveillance Data Center
University of Washington
c/o Fred Hutchinson Cancer Research Center
MP474
1124 Columbia Street
Seattle, Washington 98104

This annual report is sponsored by the U.S. Department of Energy. It is based on information submitted by participating laboratories. The views and opinions expressed in this report are those of its authors and do not necessarily reflect the views of the United States Government, its agencies, or its employees.

Contents

Introduction	4
Overview	5
Labor Force by Occupational Category, 1992	6
Absences Among Work Force, 1992	7
Absences per Person	7
Diagnoses per Absence	7
Rate of Diagnoses	8
Diseases and Injuries by Diagnostic Category, 1992	9
Males and Females	11
Males	12
Females	13
Diagnoses Associated with Pregnancy, Delivery, and Conditions of Newborn	14
Diagnoses by Occupational Category, 1992	15
Males and Females	15
Males	16
Females	16
Relative Risk for Selected Disease Categories by Occupation, 1992 ..	17
Infections and Parasitic Diseases	18
Malignant Neoplasms	18
Endocrine and Metabolic Diseases	18
Mental Disorders	19
Diseases of Nervous System and Sense Organs	19
Diseases of the Circulatory System	19
Diseases of the Respiratory System	20
Diseases of the Digestive System	20
Diseases of the Genitourinary System	20
Pregnancy and Childbirth	21
Diseases of the Musculoskeletal System	21
Symptoms, Signs, and Ill-Defined Conditions	21
External Causes of Injury	22
Deaths Among Active Workers, 1992	23
Glossary and Statistical Notes	24

Introduction

Epidemiologic surveillance at U.S. Department of Energy (DOE) facilities consists of regular and systematic collection, analysis, and interpretation of data on absences due to illness and injury in the work force. Its purpose is to provide an early warning system of any health problems occurring among employees at participating sites. Data are collected by coordinators at each site and submitted to the Epidemiologic Surveillance Data Center, located at the University of Washington, where quality control procedures and analyses are carried out. Rates of absences and rates of diagnoses associated with absences are analyzed by occupation and other relevant variables. They may be compared with the disease experience of different groups within the DOE work force and with populations who do not work for DOE to identify disease patterns or clusters that may be associated with work activities. In the future, the results of epidemiologic surveillance will be combined with those of medical surveillance and exposure surveillance to form an integrated approach to worker health protection.

In this annual report, the 1992 morbidity data for the Westinghouse Savannah River Company are summarized. These analyses focus on absences of 21 or more consecutive days occurring among workers aged 16-69 years. They are arranged into six sets of tables: (1) the distribution of the labor force by occupational category and pay status; (2) the absences per person, diagnoses per absence, and diagnosis rates for the work force as a whole; (3) diagnosis rates by type of disease or injury; (4) diagnosis rates by occupational category; (5) relative risk for specific types of diseases or injury by occupational category; and (6) deaths occurring among active workers. All rates presented in this report are age-adjusted (see glossary) and represent the number of diagnoses reported per 1,000 persons in 1 year.

The data included in this report are supplemental to, but do not replace, those reported in other safety, industrial hygiene, and health physics reports prepared by DOE. They are based on absences reported by the sites. There has been no attempt to validate diagnoses with medical records, pathology, or other laboratory reports. Similarly, there has been no attempt to validate occupational information reported by the site. For reporting purposes, occupational titles have been grouped into broad categories within which a great deal of diversity in tasks and exposures is likely to exist.

Overview

Located on 310 square miles in western South Carolina, the Savannah River site is operated under contract by the Westinghouse Savannah River Company. It began operation in the early 1950s to produce tritium, plutonium-239, and other materials used in the fabrication of nuclear weapons.

The site originally consisted of five reactors, two chemical separation plants, a heavy water extraction plant, a nuclear fuel and target fabrication facility, and waste management facilities. As a result of altered defense requirements, site priorities have changed. Of the five original production reactors, four are permanently shut down with the fifth in "cold standby." The chemical separation facilities are now processing existing inventories of materials for a variety of purposes, including supplying plutonium-238 for deep space probes and converting liquid radioactive materials into solid form for storage and testing. While production of new tritium has ceased, recycling and reloading of tritium continues. In fact, the Savannah River site is the nation's only facility for recycling existing supplies of tritium from nuclear weapons. All tritium unloading, mixing, and loading will be performed in the new Replacement Tritium Facility, which is scheduled to become operational in late 1993. This facility will replace the majority of Savannah River site facilities that have processed the nation's tritium for the past 35 years.

Labor Force by Occupational Category, 1992

During 1992, there were 16,121 employees aged 16-69 identified by the Westinghouse Savannah River Company as participants in epidemiologic surveillance. The composition of the work force by occupational category and by salary status is given in Table 1. The occupational categories with the largest number of employees were professional (29%), administration (29%), and craftsmen and manual laborers (14%). Approximately 72% of white collar workers were salaried, compared with 11% of blue collar workers.

Table 1. Labor Force by Occupational Category

	Occupational Category	Number of Employees
White Collar	Administration	4,642
	Salaried	2,772
	Hourly	1,870
	Professional	4,732
	Salaried	4,665
	Hourly	67
	Technical	2,187
	Salaried	849
	Hourly	1,338
	Subtotal	11,561
Blue Collar	Service	180
	Salaried	51
	Hourly	129
	Craftsmen and Manual Laborers	2,318
	Salaried	148
	Hourly	2,170
	Nuclear	1,852
	Salaried	271
	Hourly	1,581
	Other	210
	Salaried	54
	Hourly	156
	Subtotal	4,560
	Total Number of Employees	16,121

Absences Among Work Force, 1992

Absences Per Person

In 1992, 643 of Savannah River's employees (4%) had at least one absence of 21 or more continuous work days because of illness or injury (Table 2.A). Thirty-four of these workers had two or more absences, resulting in a total of 683 absences. Women, who comprised 29% of Savannah River's work force, contributed 61% of all reported absences. Approximately 47% of women's absences were attributed to pregnancy-related events.

Table 2.A. Absences per Person

Employee Categories	Number of Workers	Number of Absences (%)					Total Persons Absent at Least Once	Total Number of Absences
		0	1	2	3	4+		
Male	11,463	11,216 (97.8)	228 (2.0)	16 (0.1)	3 (0.0)	0 (0.0)	247	269
Female	4,658	4,262 (91.5)	381 (8.2)	13 (0.3)	1 (0.0)	1 (0.0)	396	414
TOTAL	16,121	15,478 (96.0)	609 (3.8)	29 (0.2)	4 (0.0)	1 (0.0)	643	683

Diagnoses Per Absence

A total of 819 diagnoses associated with 683 absences of 21 or more days were reported to the Epidemiologic Surveillance Data Center (Table 2.B). Multiple diagnoses were reported for 105 absences (15%).

Table 2.B. Diagnoses per Absence

Employee Categories	Number of Diagnoses per Absence						Total Number of Absences	Total Number of Diagnoses
	1	2	3	4	5	10		
Male	236	22	6	2	2	1	269	326
Female	342	66	5	1	0	0	414	493
TOTAL	578	88	11	3	2	1	683	819

Rate of Diagnoses

During 1992, 819 diagnoses noted for absences of 21 or more consecutive work days yielded an age-adjusted rate of 54.1 diagnoses per 1,000 workers (Table 2.C). The rate of diagnoses among women was three times higher than the rate among men (100.2 versus 33.0 per 1,000 persons). This higher rate among women can be attributed, in part, to pregnancy-related events, as they accounted for 42% of the total diagnoses for women. Removing pregnancy-related diagnoses from analyses reduced the diagnosis rate among women to 65.4 per 1,000 persons.

Table 2.C. Rate of Diagnoses

Employee Categories	Number of Workers	Number of Diagnoses*	Crude Rate per 1,000	Age-Adjusted Rate per 1,000**	Lower 95% Confidence Limit	Upper 95% Confidence Limit
Male	11,463	326	28.4	33.0	29.4	37.1
Female	4,658	493	105.8	100.2	89.2	112.6
TOTAL	16,121	819	50.8	54.1	50.1	58.3

*Includes all diagnoses reported with an absence of 21 or more days, including absences for pregnancy and delivery.

**Standardized to age distribution of 1970 U.S. population.

Diseases and Injuries by Diagnostic Category, 1992

The age-adjusted diagnosis rates for each diagnostic category are given for all workers and separately for each gender (Tables 3-5). Table 6 describes diagnoses associated with pregnancy, delivery, and conditions of the newborn. As Table 3 shows, the three diagnostic categories with the highest rates were pregnancy and childbirth (11.7 per 1,000), circulatory system (8.0 per 1,000), and musculoskeletal system (6.9 per 1,000). Together these three categories comprise nearly 50% of all diagnoses. Because the patterns of diagnoses reported by men and women differ, Tables 4 and 5, which show the diagnosis rates separately by gender, provide a better description of disease and injury patterns in the work force.

Among men the leading diagnostic category, accounting for 22% of all diagnoses, was circulatory system problems with 51 men reporting 71 diagnoses. Ischemic disease accounted for 37% of this category, and acute myocardial infarction accounted for 18%. The second most common diagnosis group associated with an absence among men was musculoskeletal disorders with 60 men reporting 65 diagnoses. More than 75% of these diagnoses were dorsopathies. Disorders of the digestive system ranked third with 39 men reporting 42 diagnoses. Hernias and gallbladder disease accounted for 57% of these disorders, and four men reported appendicitis. The nervous system, with 18 men reporting 21 diagnoses, and external causes of injury, with 24 men reporting 25 diagnoses, were the next most common diagnosis groups among men. Sixteen injuries were related to accidents caused by transportation or falls, four were due to late effects of previous injuries, four were unspecified as to the cause of the injury, and one injury was fire-related. Seventeen men reported 20 genitourinary system disorders, of which nine diagnoses were related to kidney problems. Among the respiratory system diagnoses, 44% were related to chronic conditions and 31% were due to upper respiratory problems. Seventeen men reported a malignancy in 1992. There were three cases of lung cancer; two cases each of Hodgkin's disease, lymphoma, colon cancer, and kidney cancer; and one case each of multiple myeloma, melanoma, and cancer of the prostate, larynx, bladder, and testes.

Among women the leading diagnostic category was pregnancy and childbirth with 193 women reporting 209 diagnoses. This category, along with conditions of the newborn, is discussed on page 12. The second most common diagnosis group associated with an absence among women was the genitourinary system with 70 women reporting 82 diagnoses. More than 23% of genitourinary diagnoses were associated with ovarian cysts, 20% with genital pain or bleeding, and 16% with endometriosis. Disorders of the digestive system ranked third with 41 women reporting 50 diagnoses. Gallbladder disorders were the most common followed by problems of teeth or jaw and hernias. The fourth leading diagnosis group was disorders of the musculoskeletal system with 36 women reporting 39 diagnoses. Sixty percent of these diagnoses were dorsopathies. Among the eight women who reported 12 circulatory system diagnoses were three who reported ischemic disease. Eleven women reported 12 nervous system disorders, and 15 women reported 15 respiratory system problems of which 60% were related to pneumonia or bronchitis.

Among the ten women who reported a malignancy in 1992, there were four breast cancers; one report each of colon cancer, melanoma, ovarian cancer, uterine cancer, cervical cancer, and pancreatic cancer; and one neoplasm of unspecified site. One woman reported two neoplasms.

The age-adjusted diagnosis rate for women was higher than for men in 12 of the 15 major diagnosis categories. Women's and men's rates were similar for malignant neoplasms and symptoms, signs, and ill-defined conditions. Men had higher external cause of injury rates.

Table 3. Diseases and Injuries by Diagnostic Category – Males and Females

Category of Diagnoses	ICD9-CM Code	Number of Diagnoses†	Age-Adjusted Rate per 1,000*	Lower 95% Confidence Limit per 1,000	Upper 95% Confidence Limit per 1,000
Infections & parasitic diseases	001-139	20	1.2	0.8	2.0
Malignant neoplasms	140-208, 230-234	31	2.3	1.6	3.4
Digestive organs	150-159	4	0.3	0.1	1.0
Respiratory system	160-165	4	0.4	0.1	1.1
Breast	174-175	4	0.2	0.1	0.6
Genitourinary	179-185	4	0.3	0.1	0.8
Nervous system	191-192	0	0.0	0.0	0.0
Leukemia, lymphoma	200-208	6	0.5	0.2	1.2
Benign neoplasms & other	210-229, 235-239	22	1.1	0.7	1.6
Endocrine & metabolic diseases	240-279	14	0.9	0.5	1.6
Blood & blood-forming organs	280-289	2	0.2	0.0	0.8
Mental disorders	290-319	19	1.2	0.7	2.0
Alcoholism	303	1	0.0	0.0	0.2
Drug abuse	304-305	0	0.0	0.0	0.0
Nervous system & sense organs	320-389	33	3.0	2.1	4.2
Circulatory system	390-459	83	8.0	6.4	10.1
Acute myocardial infarction	410	13	1.2	0.7	2.2
Ischemic disease, not M.I.	411-414	32	3.6	2.5	5.1
Cerebrovascular disease	430-438	7	0.7	0.3	1.6
Respiratory system	460-519	31	2.2	1.5	3.3
Upper respiratory	460-465, 470-478	9	0.6	0.3	1.2
Pneumonia/bronchitis	466, 480-487	12	0.7	0.4	1.4
Chronic respiratory conditions	490-496	9	0.8	0.4	1.7
Digestive system	520-579	92	6.1	4.8	7.6
Hernias	550-553	27	1.9	1.3	2.9
Gall bladder disease	574-575	17	1.1	0.6	1.9
Genitourinary system	580-629	102	5.7	4.6	7.1
Benign prostatic hypertrophy	600	0	0.0	0.0	0.0
Endometriosis	617	13	0.6	0.3	1.0
Ovarian cysts	620.0-620.2	19	1.0	0.6	1.6
Female genital pain/bleeding	625-626	16	0.8	0.5	1.3
Pregnancy & childbirth	630-676	209	11.7	10.1	13.5
Skin & subcutaneous tissue	680-709	5	0.2	0.1	0.6
Musculoskeletal system	710-739	104	6.9	5.6	8.6
Dorsopathies	720-724	73	4.5	3.5	5.8
Congenital anomalies**	740-759	4	0.2	0.1	0.6
Conditions in perinatal period**	760-779	1	0.0	0.0	0.2
Symptoms, signs & ill-defined cond.	780-799	17	1.0	0.6	1.7
External causes of injury	E800-999	30	2.1	1.4	3.1
Transport accidents	E800-849	11	0.6	0.3	1.2
Medical accidents	E870-879	1	0.1	0.0	0.5
Accidental falls	E880-888	9	0.8	0.4	1.6
Accidents-struck by objects	E916-918	0	0.0	0.0	0.0
Accidents-machinery	E919	0	0.0	0.0	0.0
Total minus pregnancies		605	42.1	38.6	46.0
TOTAL		819	54.1	50.1	58.3

†Includes all diagnoses reported with an absence of 21 or more days.

*Standardized to age distribution of 1970 U.S. population.

**Occurring in infants born to female employees.

Table 4. Diseases and Injuries by Diagnostic Category – Males

Category of Diagnoses	ICD9-CM Code	Number of Diagnoses†	Age-Adjusted Rate per 1,000*	Lower 95% Confidence Limit per 1,000	Upper 95% Confidence Limit per 1,000
Infections & parasitic diseases	001-139	12	1.1	0.6	1.9
Malignant neoplasms	140-208, 230-234	19	2.0	1.3	3.2
Digestive organs	150-159	2	0.2	0.0	0.8
Respiratory system	160-165	4	0.5	0.2	1.4
Breast	174-175	0	0.0	0.0	0.0
Genitourinary	179-185	1	0.1	0.0	0.9
Nervous system	191-192	0	0.0	0.0	0.0
Leukemia, lymphoma	200-208	6	0.6	0.3	1.4
Benign neoplasms & other	210-229, 235-239	5	0.4	0.1	0.9
Endocrine & metabolic diseases	240-279	7	0.6	0.3	1.4
Blood & blood-forming organs	280-289	0	0.0	0.0	0.0
Mental disorders	290-319	11	0.9	0.5	1.8
Alcoholism	303	1	0.1	0.0	0.4
Drug abuse	304-305	0	0.0	0.0	0.0
Nervous system & sense organs	320-389	21	2.4	1.5	3.7
Circulatory system	390-459	71	8.5	6.7	10.9
Acute myocardial infarction	410	13	1.5	0.9	2.7
Ischemic disease, not M.I.	411-414	26	3.5	2.3	5.1
Cerebrovascular disease	430-438	6	0.8	0.4	1.9
Respiratory system	460-519	16	1.8	1.1	3.0
Upper respiratory	460-465, 470-478	5	0.5	0.2	1.3
Pneumonia/bronchitis	466, 480-487	3	0.4	0.1	1.1
Chronic respiratory conditions	490-496	7	0.9	0.4	1.8
Digestive system	520-579	42	3.9	2.8	5.4
Hernias	550-553	20	1.8	1.1	2.9
Gall bladder disease	574-575	4	0.3	0.1	0.9
Genitourinary system	580-629	20	1.9	1.2	3.0
Benign prostatic hypertrophy	600	0	0.0	0.0	0.0
Endometriosis	617	N/A	N/A	N/A	N/A
Ovarian cysts	620.0-620.2	N/A	N/A	N/A	N/A
Female genital pain/bleeding	625-626	N/A	N/A	N/A	N/A
Pregnancy & childbirth	630-676	N/A	N/A	N/A	N/A
Skin & subcutaneous tissue	680-709	1	0.1	0.0	0.4
Musculoskeletal system	710-739	65	6.1	4.7	8.0
Dorsopathies	720-724	50	4.4	3.3	6.0
Congenital anomalies	740-759	0	0.0	0.0	0.0
Conditions in perinatal period	760-779	0	0.0	0.0	0.0
Symptoms, signs & ill-defined cond.	780-799	11	1.0	0.5	1.8
External causes of injury	E800-999	25	2.3	1.5	3.5
Transport accidents	E800-849	8	0.7	0.3	1.5
Medical accidents	E870-879	0	0.0	0.0	0.0
Accidental falls	E880-888	8	0.8	0.4	1.7
Accidents-struck by objects	E916-918	0	0.0	0.0	0.0
Accidents-machinery	E919	0	0.0	0.0	0.0
Total minus pregnancies		N/A	N/A	N/A	N/A
TOTAL		326	33.0	29.4	37.1

†Includes all diagnoses reported with an absence of 21 or more days.

*Standardized to age distribution of 1970 U.S. population.

Table 5. Diseases and Injuries by Diagnostic Category – Females

Category of Diagnoses	ICD9-CM Code	Number of Diagnoses†	Age-Adjusted Rate per 1,000*	Lower 95% Confidence Limit per 1,000	Upper 95% Confidence Limit per 1,000
Infections & parasitic diseases	001-139	8	2.0	0.8	4.6
Malignant neoplasms	140-208, 230-234	12	2.4	1.2	4.9
Digestive organs	150-159	2	0.8	0.1	4.4
Respiratory system	160-165	0	0.0	0.0	0.0
Breast	174-175	4	0.8	0.3	2.1
Genitourinary	179-185	3	0.5	0.2	1.7
Nervous system	191-192	0	0.0	0.0	0.0
Leukemia, lymphoma	200-208	0	0.0	0.0	0.0
Benign neoplasms & other	210-229, 235-239	17	2.8	1.7	4.6
Endocrine & metabolic diseases	240-279	7	1.3	0.6	2.8
Blood & blood-forming organs	280-289	2	0.9	0.2	4.3
Mental disorders	290-319	8	2.0	0.8	4.6
Alcoholism	303	0	0.0	0.0	0.0
Drug abuse	304-305	0	0.0	0.0	0.0
Nervous system & sense organs	320-389	12	4.3	2.1	8.4
Circulatory system	390-459	12	6.1	2.9	12.4
Acute myocardial infarction	410	0	0.0	0.0	0.0
Ischemic disease, not M.I.	411-414	6	4.5	1.8	11.1
Cerebrovascular disease	430-438	1	0.2	0.0	1.5
Respiratory system	460-519	15	2.3	1.3	3.9
Upper respiratory	460-465, 470-478	4	0.5	0.2	1.5
Pneumonia/bronchitis	466, 480-487	9	1.5	0.8	3.0
Chronic respiratory conditions	490-496	2	0.2	0.1	0.9
Digestive system	520-579	50	13.7	9.3	20.2
Hernias	550-553	7	2.3	1.0	5.7
Gall bladder disease	574-575	13	3.6	1.8	7.3
Genitourinary system	580-629	82	15.8	11.8	21.2
Benign prostatic hypertrophy	600	N/A	N/A	N/A	N/A
Endometriosis	617	13	1.8	1.0	3.3
Ovarian cysts	620.0-620.2	19	3.2	2.0	5.1
Female genital pain/bleeding	625-626	16	3.8	1.6	8.9
Pregnancy & childbirth	630-676	209	34.1	29.6	39.3
Skin & subcutaneous tissue	680-709	4	0.6	0.2	1.8
Musculoskeletal system	710-739	39	8.9	5.6	14.1
Dorsopathies	720-724	23	5.4	2.7	10.5
Congenital anomalies**	740-759	4	0.6	0.2	1.8
Conditions in perinatal period**	760-779	1	0.1	0.0	0.8
Symptoms, signs & ill-defined cond.	780-799	6	0.9	0.4	2.0
External causes of injury	E800-999	5	1.4	0.5	4.2
Transport accidents	E800-849	3	0.5	0.2	1.7
Medical accidents	E870-879	1	0.2	0.0	1.5
Accidental falls	E880-888	1	0.7	0.1	4.9
Accidents-struck by objects	E916-918	0	0.0	0.0	0.0
Accidents-machinery	E919	0	0.0	0.0	0.0
Total minus pregnancies		279	65.4	55.6	76.9
TOTAL		493	100.2	89.2	112.6

†Includes all diagnoses reported with an absence of 21 or more days.

*Standardized to age distribution of 1970 U.S. population.

**Occurring in infants born to female employees.

During 1992, 193 women reported 214 diagnoses related to pregnancy and conditions of newborn; 103 of these were normal deliveries (Table 6). Under complications of pregnancy, 58 women reported 66 diagnoses. The major diagnosis groups in this category included hypertension (17), early or threatened labor (11), and ectopic pregnancy (8). Under complications of labor and delivery, 38 women reported 40 diagnoses. Cesarean delivery without mention of reason (21) was the major diagnosis group in this category. There were four newborns with congenital malformations and one pregnancy with a perinatal complication that resulted in a stillbirth.

Table 6. Diseases Associated with Pregnancy, Delivery, and Conditions of Newborn

Category of Diagnoses	ICD9-CM Code	Number of Diagnoses	Age-Adjusted Rate per 1,000*	Lower 95% Confidence Limit per 1,000	Upper 95% Confidence Limit per 1,000
Complications of pregnancy	630-648	66	10.4	8.1	13.4
Normal delivery	650	103	17.5	14.3	21.4
Complications of labor/delivery/puerperium	651-676	40	6.2	4.5	8.6
Congenital anomalies**	740-759	4	0.6	0.2	1.8
Conditions in perinatal period**	760-779	1	0.1	0.0	0.8
TOTAL		214	34.9	30.3	40.1

Includes all diagnoses reported with an absence of 21 or more days.

*Standardized to age distribution of 1970 U.S. population.

Includes delivery by cesarean section and multiple births.

**Occurring in infants born to female employees.

Diagnoses by Occupational Category, 1992

During 1992, the age-adjusted diagnosis rate for all employees was higher among white collar workers than blue collar workers (59.0 versus 40.6 per 1,000 persons) (Table 7). Service workers, who comprised 1% of the work force, had the highest diagnosis rate (84.1 per 1,000 persons) with 13 people reporting 16 diagnoses. The second highest diagnosis rate was among technical workers with 106 people reporting 136 diagnoses (71.9 per 1,000 persons). Administrators ranked third with 248 workers reporting 312 diagnoses (68.7 per 1,000 persons).

Table 7. Diagnoses by Occupational Category – Males and Females

	Occupational Category	Number of Workers	Number of Diagnoses*	Age-Adjusted Rate per 1,000**	Lower 95% Confidence Limit	Upper 95% Confidence Limit
White Collar	Administration	4,642	312	68.7	60.7	77.8
	Professional	4,732	182	44.1	37.8	51.5
	Technical	2,187	136	71.9	59.7	86.6
	Subtotal	11,561	630	59.0	54.1	64.2
Blue Collar	Service	180	16	84.1	49.2	143.8
	Craftsmen and Manual Laborers	2,318	70	29.6	21.9	40.1
	Nuclear	1,852	102	58.9	46.7	74.3
	Other	210	1	9.6	1.4	68.5
	Subtotal	4,560	189	40.6	34.3	48.1
TOTAL	16,121	819	54.1	50.1	58.3	

*Includes all diagnoses reported with an absence of 21 or more days, including absences for pregnancy and delivery.

**Standardized to age distribution of 1970 U.S. population.

Among men, the diagnosis rates were similar for white collar workers (32.0 per 1,000) and blue collar workers (31.7 per 1,000) (Table 8). Service workers had the highest diagnosis rate with nine men reporting 11 diagnoses (74.8 per 1,000 persons). Nuclear and technical workers followed with 88 men reporting 114 diagnoses (45.9 and 45.3 per 1,000 persons, respectively). Professional workers ranked fourth with 76 men reporting 109 diagnoses (32.6 per 1,000 persons).

Among women, white collar workers had higher diagnosis rates (102.9 per 1,000) than blue collar workers (82.5 per 1,000) (Table 9). The highest diagnosis rate was among technical workers with 60 women reporting 78 diagnoses (118.0 per 1,000). Employees in administrative positions followed with 215 women reporting 269 diagnoses (101.8 per 1,000), and nuclear workers ranked third with 36 women reporting 46 diagnoses (94.5 per 1,000).

Table 8. Diagnoses by Occupational Category – Males

	Occupational Category	Number of Workers	Number of Diagnoses*	Age-Adjusted Rate per 1,000**	Lower 95% Confidence Limit	Upper 95% Confidence Limit
White Collar	Administration	2,118	43	22.3	16.2	30.7
	Professional	4,067	109	32.6	26.8	39.6
	Technical	1,478	58	45.3	34.3	59.8
	Subtotal	7,663	210	32.0	27.8	36.9
Blue Collar	Service	145	11	74.8	39.7	140.9
	Craftsmen and Manual Laborers	2,061	49	24.0	17.0	33.8
	Nuclear	1,438	56	45.9	34.1	61.8
	Other	156	0	0.0	0.0	0.0
	Subtotal	3,800	116	31.7	25.7	39.2
TOTAL	11,463	326	33.0	29.4	37.1	

*Includes all diagnoses reported with an absence of 21 or more days.

**Standardized to age distribution of 1970 U.S. population.

Table 9. Diagnoses by Occupational Category – Females

	Occupational Category	Number of Workers	Number of Diagnoses*	Age-Adjusted Rate per 1,000**	Lower 95% Confidence Limit	Upper 95% Confidence Limit
White Collar	Administration	2,524	269	101.8	87.4	118.6
	Professional	665	73	92.4	67.8	125.8
	Technical	709	78	118.0	89.2	156.0
	Subtotal	3,898	420	102.8	90.7	116.5
Blue Collar	Service	35	5	89.3	35.5	224.9
	Craftsmen and Manual Laborers	257	21	77.2	37.7	158.0
	Nuclear	414	46	94.5	64.2	139.1
	Other	54	1	14.2	2.0	100.5
	Subtotal	760	73	82.5	60.8	111.9
TOTAL	4,658	493	100.2	89.2	112.6	

*Includes all diagnoses reported with an absence of 21 or more days, including absences for pregnancy and delivery.

**Standardized to age distribution of 1970 U.S. population.

Relative Risk for Selected Disease Categories by Occupation, 1992

In Tables 10.A through 10.M, the risk of one or more absences associated with selected diagnostic categories among specific occupational groups are compared to the risk among the entire Savannah River work force. This comparison takes into account the possible confounding effects of age and gender. In contrast to the previous series of tables, these analyses examine the risk of a worker having **one or more** absences in a diagnostic category during 1992. This was done to minimize the problem associated with one person having multiple absences for the same condition.

The statistical methods used to compare rates of absence are the relative risk and the 95% confidence interval. The relative risk is the rate of an absence in one group divided by the rate in a reference (comparison) group. A relative risk of *1.0* indicates that both groups have the same risk of absence. A relative risk of *2.0* indicates that a group has twice the risk of the reference group, whereas a relative risk of *0.5* implies that a group has one-half the risk of the reference group. The confidence interval represents the range of values for the relative risk that are consistent with the observed data. A 95% confidence interval implies that there is a 95% chance that the true relative risk lies within the interval. If the confidence interval includes the value *1.0* then the observed difference in absence rates is likely to have occurred by chance; in other words, the relative risk is not statistically significant. For example, a relative risk with a confidence interval of *0.8 to 4.4* would not be considered statistically significant, whereas a relative risk with an interval of *1.7 to 4.2* would be considered statistically significant.

Relative to the entire Savannah River work force, persons classified as working in service occupations were found to have a statistically significant elevated risk of absence associated with diseases of the nervous system (relative risk 7.7, 95% confidence interval 1.8 to 32.7) (Table 10.E), diseases of the digestive system (relative risk 4.8, 95% confidence interval 1.7 to 13.2) (Table 10.H), and diseases of the genitourinary system (relative risk 3.7, 95% confidence interval 1.2 to 11.8) (Table 10.I). Similarly, persons categorized in nuclear occupations were at an increased risk for absences associated with disorders of the musculoskeletal system (relative risk 1.7, 95% confidence interval 1.1 to 2.9) (Table 10.K). Risk of absence was slightly elevated among professional workers for pregnancy and childbirth events and among craftsmen and manual laborers for external causes of injury; however, these increases were of borderline statistical significance.

Table 10.A. Infections and Parasitic Diseases

Occupational Category	Person-Years	# Persons with at Least One Event*	Relative Risk**	Lower 95% Confidence Limit	Upper 95% Confidence Limit
Administration	4,642	3	0.4	0.1	1.6
Professional	4,732	5	1.0	0.4	2.8
Technical	2,187	5	1.9	0.7	5.1
Service	180	1	4.8	0.6	36.3
Craftsmen and Manual Laborers	2,318	2	0.8	0.2	3.5
Nuclear	1,852	3	1.3	0.4	4.7
TOTAL (Reference Group)	15,911	19	1.0		

Table 10.B. Malignant Neoplasms

Occupational Category	Person-Years	# Persons with at Least One Event*	Relative Risk**	Lower 95% Confidence Limit	Upper 95% Confidence Limit
Administration	4,642	9	1.8	0.4	2.2
Professional	4,732	10	1.3	0.6	2.8
Technical	2,187	3	0.7	0.2	2.4
Service	180	0	0.0	0.0	0.0
Craftsmen and Manual Laborers	2,318	0	0.0	0.0	0.0
Nuclear	1,852	5	1.8	0.7	4.7
TOTAL (Reference Group)	15,911	27	1.0		

Table 10.C. Endocrine and Metabolic Diseases

Occupational Category	Person-Years	# Persons with at Least One Event*	Relative Risk**	Lower 95% Confidence Limit	Upper 95% Confidence Limit
Administration	4,642	6	1.5	0.5	4.0
Professional	4,732	3	0.9	0.2	3.5
Technical	2,187	0	0.0	0.0	0.0
Service	180	0	0.0	0.0	0.0
Craftsmen and Manual Laborers	2,318	1	0.7	0.1	6.2
Nuclear	1,852	2	1.5	0.3	6.9
TOTAL (Reference Group)	15,911	12	1.0		

*Persons with multiple absences during time period counted only once.

**Adjusted for age and gender - compared with all occupational categories.

Table 10.D. Mental Disorders

Occupational Category	Person-Years	# Persons with at Least One Event*	Relative Risk**	Lower 95% Confidence Limit	Upper 95% Confidence Limit
Administration	4,642	5	0.8	0.3	2.2
Professional	4,732	5	1.1	0.4	3.2
Technical	2,187	4	1.6	0.5	4.7
Service	180	0	0.0	0.0	0.0
Craftsmen and Manual Laborers	2,318	1	0.6	0.1	4.0
Nuclear	1,852	2	1.1	0.2	4.8
TOTAL (Reference Group)	15,911	17	1.0		

Table 10.E. Diseases of Nervous System and Sense Organs

Occupational Category	Person-Years	# Persons with at Least One Event*	Relative Risk**	Lower 95% Confidence Limit	Upper 95% Confidence Limit
Administration	4,642	8	0.8	0.3	1.8
Professional	4,732	7	0.8	0.4	2.0
Technical	2,187	4	1.7	0.3	2.8
Service	180	2	7.7	1.8	32.7
Craftsmen and Manual Laborers	2,318	4	1.4	0.5	4.0
Nuclear	1,852	4	1.4	0.5	4.0
TOTAL (Reference Group)	15,911	29	1.0		

Table 10.F. Diseases of Circulatory System

Occupational Category	Person-Years	# Persons with at Least One Event*	Relative Risk**	Lower 95% Confidence Limit	Upper 95% Confidence Limit
Administration	4,642	14	0.9	0.5	1.7
Professional	4,732	20	1.0	0.6	1.6
Technical	2,187	11	1.2	0.6	2.3
Service	180	2	3.2	0.8	13.2
Craftsmen and Manual Laborers	2,318	4	0.6	0.2	1.8
Nuclear	1,852	8	1.4	0.7	3.0
TOTAL (Reference Group)	15,911	59	1.0		

*Persons with multiple absences during time period counted only once.

**Adjusted for age and gender - compared with all occupational categories.

Table 10.G. Diseases of Respiratory System

Occupational Category	Person-Years	# Persons with at Least One Event*	Relative Risk**	Lower 95% Confidence Limit	Upper 95% Confidence Limit
Administration	4,642	7	0.6	0.3	1.5
Professional	4,732	9	1.3	0.6	2.8
Technical	2,187	7	1.5	0.7	3.5
Service	180	0	0.0	0.0	0.0
Craftsmen and Manual Laborers	2,318	2	0.8	0.2	3.2
Nuclear	1,852	4	1.3	0.5	3.9
TOTAL (Reference Group)	15,911	29	1.0		

Table 10.H. Diseases of Digestive System

Occupational Category	Person-Years	# Persons with at Least One Event*	Relative Risk**	Lower 95% Confidence Limit	Upper 95% Confidence Limit
Administration	4,642	35	1.1	0.7	1.7
Professional	4,732	13	0.7	0.4	1.2
Technical	2,187	9	0.8	0.4	1.5
Service	180	4	4.8	1.7	13.2
Craftsmen and Manual Laborers	2,318	10	1.2	0.6	2.3
Nuclear	1,852	9	1.0	0.5	2.1
TOTAL (Reference Group)	15,911	80	1.0		

Table 10.I. Diseases of Genitourinary System

Occupational Category	Person-Years	# Persons with at Least One Event*	Relative Risk**	Lower 95% Confidence Limit	Upper 95% Confidence Limit
Administration	4,642	39	1.5	0.7	1.4
Professional	4,732	9	0.6	0.3	1.2
Technical	2,187	17	1.3	0.8	2.2
Service	180	3	3.7	1.2	11.8
Craftsmen and Manual Laborers	2,318	6	0.8	0.4	2.0
Nuclear	1,852	12	1.4	0.7	2.5
TOTAL (Reference Group)	15,911	86	1.0		

*Persons with multiple absences during time period counted only once.

**Adjusted for age and gender - compared with all occupational categories.

Table 10.J. Pregnancy and Childbirth

Occupational Category	Person-Years	# Persons with at Least One Event*	Relative Risk**	Lower 95% Confidence Limit	Upper 95% Confidence Limit
Administration	4,642	101	1.0	0.8	1.2
Professional	4,732	41	1.3	0.9	1.8
Technical	2,187	27	1.0	0.7	1.5
Service	180	0	0.0	0.0	0.0
Craftsmen and Manual Laborers	2,318	11	1.0	0.5	1.8
Nuclear	1,852	13	0.9	0.5	1.5
TOTAL (Reference Group)	15,911	193	1.0		

Table 10.K. Diseases of Musculoskeletal System

Occupational Category	Person-Years	# Persons with at Least One Event*	Relative Risk**	Lower 95% Confidence Limit	Upper 95% Confidence Limit
Administration	4,642	26	0.8	0.5	1.3
Professional	4,732	23	0.9	0.6	1.4
Technical	2,187	15	1.1	0.6	1.9
Service	180	1	1.7	0.1	7.0
Craftsmen and Manual Laborers	2,318	13	1.1	0.6	2.0
Nuclear	1,852	18	1.7	1.1	2.9
TOTAL (Reference Group)	15,911	96	1.0		

Table 10.L. Symptoms, Signs, and Ill-Defined Conditions

Occupational Category	Person-Years	# Persons with at Least One Event*	Relative Risk**	Lower 95% Confidence Limit	Upper 95% Confidence Limit
Administration	4,642	6	1.2	0.5	3.2
Professional	4,732	4	1.9	0.3	3.1
Technical	2,187	1	0.4	0.1	3.2
Service	180	0	0.0	0.0	0.0
Craftsmen and Manual Laborers	2,318	1	0.6	0.1	4.4
Nuclear	1,852	3	1.8	0.5	6.2
TOTAL (Reference Group)	15,911	15	1.0		

*Persons with multiple absences during time period counted only once.

**Adjusted for age and gender - compared with all occupational categories.

Table 10.M. External Causes of Injury

Occupational Category	Person-Years	# Persons with at Least One Event*	Relative Risk**	Lower 95% Confidence Limit	Upper 95% Confidence Limit
Administration	4,642	7	1.5	0.4	2.3
Professional	4,732	5	0.5	0.2	1.4
Technical	2,187	5	1.3	0.5	3.5
Service	180	1	3.2	0.4	23.5
Craftsmen and Manual Laborers	2,318	9	2.0	0.9	4.4
Nuclear	1,852	2	0.6	0.1	2.5
TOTAL (Reference Group)	15,911	29	1.0		

*Persons with multiple absences during time period counted only once.

**Adjusted for age and gender - compared with all occupational categories.

Deaths Among Active Workers, 1992

During 1992, 17 deaths among active workers were reported to the Epidemiologic Surveillance Data Center. Malignant neoplasms were noted for four of the workers. One death was attributed to melanoma, another to pancreatic cancer, and two deaths were attributed to lung cancer. Cardiovascular disease, including myocardial infarction, was mentioned in six reports. Diabetes was the underlying cause for one of these deaths. There were four deaths due to external causes of injury: three deaths were related to motor vehicle accidents and one death was caused by a firearm. Two deaths were attributed to cardiac arrest of which one reported pneumonia as the underlying cause. There was one death related to asthma.

DIAGNOSTIC CATEGORIES

Category of Diagnoses	ICD-9-CM Code	Types of Illness in Category
All conditions	001-V82	All reported health events.
Infectious and parasitic diseases	001-139	Diseases caused by bacteria, viruses, and parasites.
Malignant neoplasms	140-208, 230-234	All cancers, regardless of the part of the body affected.
Benign neoplasms and neoplasms of uncertain behavior and unspecified nature	210-229, 235-239	Tumors that are not cancerous or that do not exhibit clearly malignant behavior, regardless of the part of the body affected.
Endocrine, nutritional and metabolic diseases, and disorders of the immune system	240-279	Diseases and conditions affecting the hormone secreting glands and organs; nutritional disorders, such as vitamin deficiency; metabolic diseases, such as diabetes and gout; and problems affecting the antibody producing system.
Diseases of the blood and blood-forming organs	280-289	Includes anemia and hemophilia, but excludes leukemia.
Mental disorders	290-319	Psychiatric diagnoses, such as dementia, schizophrenia, depression, and anxiety disorders; alcoholism; drug dependence; and eating disorders, such as bulimia.
Diseases of the nervous system and sense organs	320-389	Diseases affecting the brain, spinal cord, and peripheral nerves. Examples include meningitis; encephalitis; hereditary diseases, such as Huntington's chorea; Alzheimer's and Parkinson's disease; epilepsy; multiple sclerosis; migraine; diseases of the eye, such as cataract and glaucoma; and diseases of the ear, such as conductive hearing loss and otitis.
Diseases of the circulatory system	390-459	Diseases involving the heart, arteries, veins, and lymphatic system. Examples include rheumatic fever, heart murmurs, heart attacks, angina, hardening of the arteries, varicose veins, hemorrhoids, and phlebitis.
Diseases of the respiratory system	460-519	Includes colds, sinusitis, laryngitis, pneumonia and influenza, chronic bronchitis, asthma, and emphysema.
Diseases of the digestive system	520-579	Diseases affecting the teeth and mouth, salivary glands, digestive tract, and the abdominal cavity. Examples include dental abscess, ulcers, appendicitis, hepatitis (excluding viral hepatitis), cirrhosis of the liver, gallstones, pancreatitis, abdominal hernia, and intestinal polyps.
Diseases of the genitourinary system	580-629	Diseases affecting the kidneys, the prostate, and testes; benign breast diseases; infertility (male and female); pelvic inflammatory disease; diseases of the ovary; and menstrual disorders.
Complications of pregnancy, childbirth, and puerperium	630-676	Includes miscarriage; complications of pregnancy, such as hemorrhage; pregnancy-related high blood pressure; pre-eclampsia; premature labor or other complications of labor.
Diseases of the skin and subcutaneous tissue	680-709	Includes acne, cellulitis, sunburn, psoriasis, and seborrhea.
Diseases of the musculoskeletal system and connective tissue	710-739	Includes arthritis, systemic lupus erythematosus, ankylosing spondylitis, herniated intervertebral disc ("slipped disc"), lumbago, sciatica, rheumatism, tendinitis, and osteoporosis.
Congenital anomalies	740-759	Abnormal anatomical development present at birth. Includes spina bifida, cleft palate, harelip, and various chromosomal anomalies, such as Klinefelter's syndrome.
Certain conditions originating in the perinatal period	760-779	Conditions or diseases of the mother that can produce perinatal illness or death of the fetus or newborn. Examples include maternal high blood pressure, maternal malnutrition, ectopic pregnancy, and breech birth. Also includes other conditions originating in the perinatal period, such as fetal malnutrition or slow growth, injuries related to birth trauma, and perinatal jaundice.
Symptoms, signs, and ill-defined conditions	780-799	Symptoms, signs, abnormal results of laboratory or other tests, and conditions for which no specific diagnosis has been made. Examples include blackout, chills, dizziness, fatigue, pallor, abnormal weight loss, undiagnosed chest pain, and heartburn.
Injury and poisoning	800-999	Dislocation of joints; sprains and strains of joints and associated muscles; concussions; bruises; cuts; internal injuries due to crushing, puncture, tearing, or blunt impact; burns; blisters; poisoning; frostbite; heat stroke; and complications of medical or surgical care.
Fractures, all sites	800-829	Cracks or breaks of any bone.
Dislocations	830-839	Separation of a bone from its normal socket or joint.
Sprains and strains of joints and adjacent muscles	840-848	Sprains include injuries to muscle from overexertion or from stretching the muscle beyond its normal limit. Sprains include injuries involving tearing or overextending the ligaments of a joint.
Intracranial injuries excluding those with skull fractures	850-854	Includes concussions, internal bruises, and hemorrhages within the skull without a fracture of the bones of the skull.
Internal injuries of the chest, abdomen, and pelvis	860-869	Includes internal injuries to the chest, abdomen, and pelvis and the organs within these areas of the body that do not involve an open wound.
Open wounds	870-897	Includes animal bites, cuts, lacerations, punctures, and amputations, excluding the arteries and veins.
Other injuries and effects of external causes	900-999	Miscellaneous injuries, including injuries to the arteries and veins, problems that occur an extended period of time after the injury has taken place ("late effects"), superficial bruises and abrasions, burns, post-injury shock, poisoning, toxic side effects of chemicals, heat stroke, electrocution, and altitude sickness.
Motor vehicle traffic accidents (external)	E810-E819	Includes accidents involving motor vehicles alone or with other motor vehicles, pedestrians, or vehicles operated by pedals.
Other accidents (external)	E916-E928	Includes accidents involving falling objects or machinery; accidents related to explosions; and those related to electrical current, radiation, hot or corrosive substances, noise, and overexertion.
Supplementary classifications related to personal or family history of disease	V10-V19	Covers situations in which the person is not ill or injured but has a personal or family history of problems, such as cancer, mental illness, allergies, or arthritis, that may affect his or her risk of illness.
Supplementary classifications related to health care for reproduction and child development	V20-V28	Includes problems related to pregnancy, postpartum care, contraception, outcome of delivery, and physical development of child.
Contact with health services for reasons other than illness or injury	V50-V59	Includes care for workers who have been treated previously for an illness or injury that is no longer present but who receive care to complete treatment or prevent recurrence.

GLOSSARY

Adjustment - A mathematical procedure for rates in which the effects of differences (such as age) in groups have been removed. The purpose of adjustment is to allow comparisons between two or more groups.

Epidemiologic Surveillance - The regular and systematic collection of data and interpretation of the distribution of illness, injury, and death in the DOE labor force over time.

ICD-9-CM - The ICD-9-CM (International Classification of Diseases-9th Revision-Clinical Modification) is based on the ICD-9 originally published by the World Health Organization and widely accepted as a standard for the coding of cause of death. The ICD-9-CM is required for the reporting of morbidity to all U.S. Public Health Service programs.

Diagnoses Rate - The number of new, reported health events observed among DOE workers per thousand DOE workers at risk during a given period of time.

STATISTICAL NOTE

The age-adjusted rate was calculated using the 1970 U.S. population. The age-adjusted rate represents the hypothetical rate that would have been observed if the 1992 or 1990-1991 group had the same age distribution as the 1970 U.S. population. The age-adjusted rate is used to compare populations that differ in age. The 1970 U.S. population was selected because it is the standard most used for published morbidity data.

The illness and injury absence rate is defined as an absence due to illness or injury of 21 or more consecutive work days, divided by the total number of workers. OSHA-recordable events may or may not involve an absence from work.

The 95% confidence interval is based on the normal approximation to the binomial distribution where the calculated illness and injury absence rate falls within the interval. The true rate lies within this interval 95% of the time.